THE DIAGNOSIS OF INFLAMMATION IN THE ANTERIOR OCULAR SEGMENT.[1]

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The ability to diagnosticate ocular inflammations is of the utmost importance. Delay in instituting treatment may result in irreparable damage to the ocular tissues, and faulty diagnosis may be followed by treatment fatal to vision. Far too often has the sight of a glaucomatous eye been destroyed by the instillation of atropine under the impression that the disease was iritis.

The purpose of this paper is to facilitate diagnosis by calling attention to the signs indicative of the forms of inflammation likely to be encountered in one's daily work.

Inflammations in the anterior ocular segment may be divided into those of the conjunctiva, the cornea, the iris and ciliary body, glaucoma, and inflammations consecutive to violence.

These inflammations have as the most noticeable feature vascular injection. The vessels participating in this injection are either the posterior conjunctival or the anterior ciliary, and depending upon which of these systems is congested we speak of conjunctival or ciliary injection. Conjunctival injection appears as a superficial network of bright red bloodvessels whose position in the conjunctiva is demonstrated by the fact that movement of this membrane causes a corresponding change in position of these vessels. The vessels can be individually distinguished. This is the injection of conjunctivitis. Ciliary injection appears as a dark red or violaceous zone surrounding the cornea, and its position beneath the conjunctiva is demonstrated by the fact that movement of this membrane does not result in a change of position of this zone. Instead of the individual vessels being distinguishable there is a general diffuse redness. This is the characteristic injection of inflammation of the cornea and iris and ciliary body.

Acute contagious conjunctivitis, or pink eye, is the classic type of conjunctivitis. The symptoms, conjunctival injection, lachrymation, photophobia, and mucopurulent discharge together with some burning and itching of the eyes, are those which exist with slight variations in all forms of conjunctivitis. This form of conjunctivitis responds readily to argyrol and boric acid flushings, and is of interest because of its epidemic tendency, one case frequently being responsible for the spread of the disease through an entire school.

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Gonorrheal conjunctivitis, of which there is the adult form and that seen in the newborn, is a destructive disease which beginning as conjunctivitis may rapidly extend to the adjacent tissues, producing in a few days even a purulent panophthalmitis. Thanks to Crede this is now a rare disease in the newborn. By the use of silver nitrate instillations in the eyes of all infants born in the Leipsic Lying-in Asylum, Crede reduced the percentage of ophthalmia neonatorum from 10.8 to between 0.1 and 0.2. The benefits obtained from this treatment are so immeasurable that Crede's prophylactic treatment cannot be too often retold. During the first bath the eyes are cleansed with pure water—not that of the bath—and cotton, and one drop of a 2 per cent. silver nitrate solution instilled into each eye. Since ophthalmia neonatorum may originate from other than gonorrheal organisms, this treatment should be used in all newborn infants. Most of the cases of gonorrheal conjunctivitis we now see belong to the adult form, and occur in patients suffering with gonorrheal urethritis or in those who have become infected through using the towels and linen previously used by gonorrheal subjects. After an incubation period varying from two or forty-eight hours the lids become red and swollen, often to such a degree that they can only with difficulty be separated. The tarsal and ocular conjunctivæ are intensely edematous, and have a rough, granular appearance. The swelling of the ocular conjunctiva ends abruptly at the margin of the cornea, and the cornea appears as if lying in a pit. The secretion during this stage is serous and tinged with blood, having much the appearance of beef juice. After two or three days the secretion becomes purulent, and the chemosis and swelling begin to subside. The most dreaded complication is involvement of the cornea, resulting in ulceration and even panophthalmitis. Treatment must first be directed toward the prevention of the infection of the second eye if it is still uninfected. This is done by hermetically sealing this eye with a watch-glass strapped down with adhesive tape. Treatment of the infected eye consists of cold compresses, instillations of argyrol, and frequent cleansing of the eyes with 1 to 5000 potassium permanganate solution. As soon as pus begins to flow from the eyes and the swelling in the lids is sufficiently reduced to allow of their eversion the tarsal conjunctiva must be painted with a 2 per cent. silver nitrate solution twice daily, care being taken that the solution does not come in contact with the cornea. When the cornea appears cloudy or its surface dulled, hot compresses must be substituted for the cold, in the effort to stimulate corneal nutrition. Gonorrheal opthalmia is so contagious that the most rigid isolation of these patients is necessary. While it is rare to find an infection of the conjunctiva showing such violent inflammation as that seen following a gonococcal invasion, other organisms will sometimes give rise to a condition which in the early stages resembles gonorrheal conjunctivitis. A resort to microscopic examination will differentiate these conditions, as the gonococcus is present if the inflammation is due to its influence.

In scrofulous children, phlyctenular conjunctivitis is a common disorder. This disease shows, in addition to the usual signs of conjunctivitis, small reddish tumefactions, about the size of a split pea or smaller, around the margin of the cornea, and often in the cornea itself. After two or three days these phlyctenules break down into small ulcers, which rapidly heal over, only to be succeeded by new crops, the process continuing over weeks and months. If, in the cornea, they leave after healing permanent opacities, which when central materially interfere with vision. Treatment of phlyctenular conjunctivitis, or if the cornea is involved, phlyctenular keratitis, should aim toward the upbuilding of the general system. The local treatment consists of atropine for its sedative effect, frequent cleansing of the eyes, and protection of the eye from light by the use of dark glasses.

Inflammation of the cornea, keratitis, shows in addition to ciliary injection some change in the polish and evenness of the surface, or some loss in the transparency of the cornea. Superficial lesions of the cornea, for example, a phlyctenular or other ulcer, appear as spots in which the lustre and evenness of the cornea are lost, the area being somewhat depressed below the general surface. If fluorescin is dropped into such an eye the spots stain a bright green. A whitish halo of corneal infiltration surrounds each of these areas. Change in the transparency of the cornea is due to change in the deeper layers, such, for example, as is seen in interstitial keratitis. Were one to examine the eyes of the little victim of congenital syphilis, with his large forehead, deeply lined face, and weeping eyes, gray or whitish spots deeply situated in the generally cloudy cornea could be seen; or if these spots were so numerous as to have become confluent, the cornea would have a general ground-glass appearance, often so dense as to obscure the underlying iris. Closer examination of these eyes would show vascular twigs, branching broom-like, appearing suddenly from beneath the corneal limbus, and penetrating toward the pupillary area.

In iritis and inflammation of the ciliary body, cyclitis, the characteristic changes are naturally in these tissues, and, owing to their location, changes occur also in the aqueous and anterior chamber. The iris is hyperemic and swollen, and as a result the pupil is small and non-responsive to light. Inflammatory exudates in the iris tissue result in change of color of the iris, readily observed by comparison with its fellow iris. The aqueous is turbid, and frequently deposits are seen on the posterior surface of the cornea as small dark-colored points over the lower half of Descemet's membrane. The pupillary margin of the iris, where it lies in contact with the anterior lens capsule, becomes glued to this structure at various points. These points of attachment, posterior synechia, upon dilatation of the pupil with atropin, become evident, as a result of which the pupil appears irregularly round, the attached points not yielding to the drug action. Aside from traumatism, iritis generally arises as a result of some constitutional condition, of which syphilis and rheumatism are the most frequent. Tuberculosis, gonorrhea, metabolic disturbances, and acute infectious fevers are responsible for a certain proportion of the cases. Treatment must therefore be directed against the constitutional condition. Locally, antiphlogistic measures and atropine should be employed. Potassium iodide and mercury facilitate absorption of the inflammatory exudates.

When there is a disproportion between the inflow and outflow of the circulating fluids in the eye, the inflow being in excess, there is a rise in intra-ocular tension. Such a condition is called glaucoma. The symptoms of glaucoma, including cupping of the nerve head and loss of sight, originate as a consequence of this elevation of tension.

Beginning with gradual elevation of tension, lasting over months, during which time the patient has attacks of cloudy vision, dull headache, sees colored rings around the street lights (halo vision), the attacks becoming more frequent and severe with the progress of the disease, this prodromal stage finally culminates in an acute glaucomatous attack, with violent pain in the eye, face, and jaws, vomiting and fever, sudden and almost complete loss of vision, injection of the eye, and a dilatation and rigidity of the pupil. The tension at this time, if tested, would be found to be extremely high. With these symptoms the trouble can be easily recognized, yet these attacks are sometimes mistaken for hemicrania: Such an attack may result in blindness in a few hours or, as more usually happens, the tension gradually goes down and the irritating signs disappear, leaving as a permanent aftermath slight reduction in visual acuity. A few weeks later, with a gradual elevation of the tension, a second attack supervenes, only to be succeeded by future attacks, each of which leaves the eye more permanently impaired, until finally it is stony hard, totally blind, and the seat of constant severe pain. This so-called acute inflammatory glaucoma is a rare condition.

In chronic inflammatory glaucoma, the more usual form, the eye passes gradually from the prodromal stage into a glaucomatous condition, with increasing redness of the globe, increasing dilatation of the pupil, and the iris slowly becoming atrophic. The tension rises slowly, but persistently, and at the same time the visual acuity recedes. The attack is not so severe as occurs in acute glaucoma, although the ultimate result of the disease is the same in both forms. Chronic inflammatory glaucoma is sometimes mistaken for iritis, and unfortunately treated with atropine. One of my preceptors in opthalmology not long ago told me of the following experience. A medical practioner brought a patient to him who for the previous three weeks had been using, with no apparent benefit, medicines prescribed for conjunctivitis. The inflammation happened to be iritis, and promptly subsided under proper treatment. The mental process at work in the mind of this practitioner must have been as follows: if a case when treated as conjunctivitis does not get well, try atropine, it may be iritis; for not long after he called in the same consultant to ascertain why, in another case, atropine was not yielding the desired result. This case was, unfortunately, chronic inflammatory glaucoma, and when first seen by the oculist the sight was entirely obliterated. I have encountered three cases of a similar nature, in each of which the sight was lost.

The uveal tract (iris, cilia y body, and choroid) supplies the ocular fluids, and Schlemm's canal is the channel through which the excess is carried off. In order to reach Schlemm's canal these fluids must first filter through the ligamentum pectinatum, a layer of loose cellular tissue which extends from the root of the iris forward to the point of junction of the sclera and cornea in the filtration angle. Dilatation of the pupil allows the iris to fill in this angle and overlie the ligamentum pectinatum, thus impeding the outflow of the ocular fluids. This happens in glaucoma, and if in such a condition further dilatation of the pupil is induced, as by the instillation of atropine, the filtration of the ocular fluids is further impeded.

Still a third form of glaucoma, chronic non-inflammatory, has, as can be inferred from its name, little or no inflammatory reaction, the diagnosis depending upon the ophthalmoscopic findings and the behavior of the visual fields.

The types of glaucoma above described are classified as primary in contradistinction to secondary glaucoma, in which either during or as the result of some other ocular disease the intra-ocular tension rises above the normal. Secondary glaucoma is sometimes observed in the treatment of iritis, where, as a result of the dilatation of the pupil, the iris is pushed into the filtration angle, thus interfering with the outflow of the ocular fluids. After a severe iridocyclitis, with the production of a total annular synechia, or a pupillary membrane, the posterior chamber is completely closed from the anterior, in this way blocking the natural lymph flow.

Violence to the eye may result in inflammation to one or more of the ocular tissues, and will show the type of inflammation characteristic to the tissues involved. Traumatism may result in a rupture of the ocular tunics, with or without coincident prolapse of the contents of the eye. Stab wounds and the penetration of foreign bodies also causing breaks in the ocular tunics; all such injuries bring up the question of a retained foreign body, and where the history of the accident does not settle this point, efforts should be made to locate a foreign body by means of direct, ophthalmoscopic, and *x*-ray examinations. If located, efforts must be made to remove the foreign body. The character of inflammation generally set up as a result of penetrating wounds of the globe and retained foreign bodies is iridocyclitis. Iridocyclitis of traumatic origin is responsible for the majority of cases of sympathetic inflammation in the second eye. Patients suffering from an iridocyclitis of the above-mentioned character must therefore be carefully watched for the beginning signs of sympathetic inflammation, which are photophobia, lacrymation, ciliary injection, deposits on the posterior corneal surface, posterior synechia, vitreous opacities, and hyperemia of the retina and optic nerve head. With the development of these signs in the uninjured eye removal of the injured eye is imperative.

The subjective symptoms of the inflammatory diseases in the anterior ocular segment yield little definite information except in glaucoma.

It is seldom that one of the ocular structures is the seat of disease without some involvement in the adjacent tissues. And so involved may this participation of two or more tissues in one inflammatory process become that even the skilled oculist has difficulty in properly differentiating the existing signs. Conjunctival injection denotes conjunctivitis, and ciliary injection shows the process to be of deeper origin. Ciliary injection occurring in the course of conjunctivitis shows an extension of the inflammation to the deeper tissues. Conjunctival injection often exists simultaneously with ciliary injection in severe inflammations, but in these cases the significant sign is the ciliary injection, and it is incumbent upon the physician to ascertain the cause for its presence, and not regard the case as merely a conjunctival inflammation. In iritis the pupil is contracted, whereas in glaucoma it is dilated. In conclusion, let me once again warn against the instillation of atropine or other mydriatic into an inflamed eye until the possibility of glaucoma as a cause of the symptoms is eliminated.

EPIDIDYMITIS DUE TO THE COLON BACILLUS.

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The subject of colon bacillus infection of the urinary tract has for some time been receiving considerable attention, and as a result cases have been reported where this group of organisms